

# Agricultural Supply Chain Resilience

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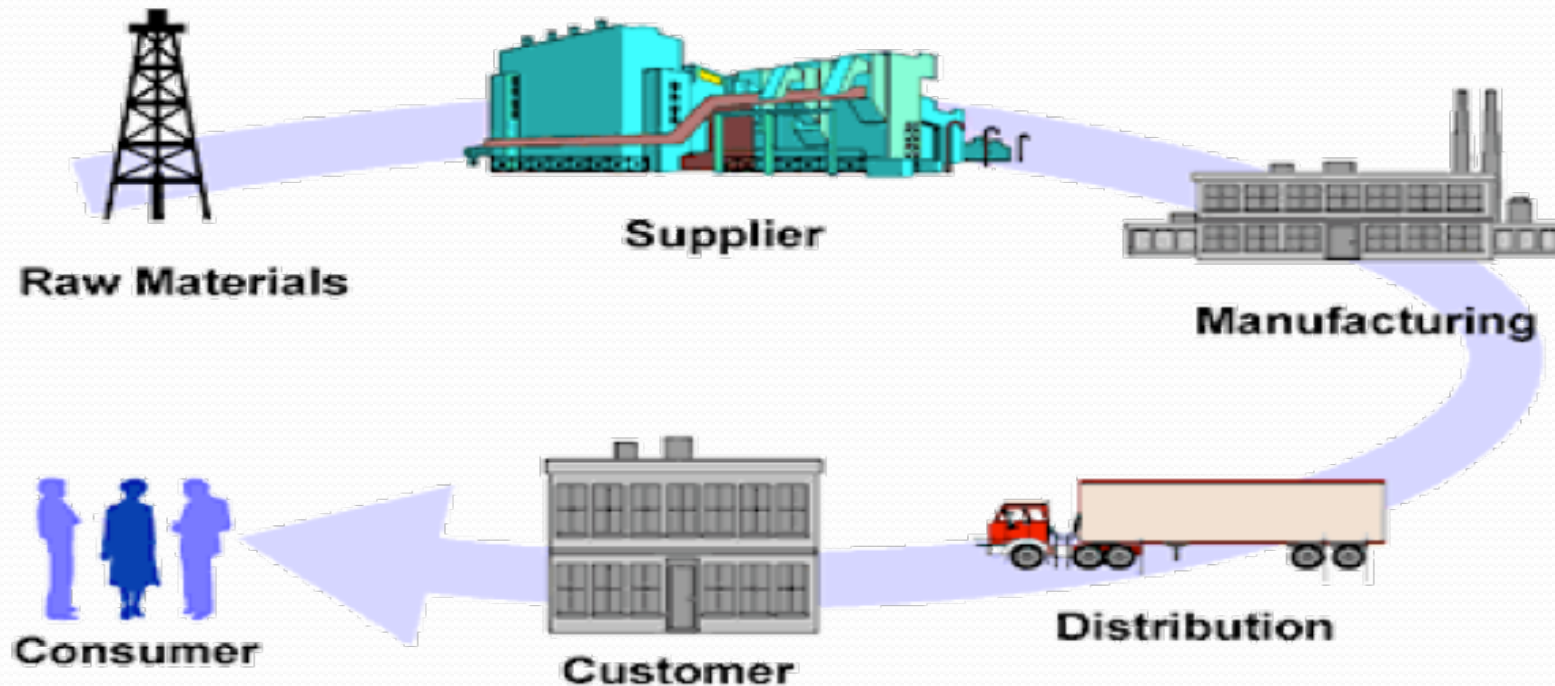
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# Terminology

- Supply Chain
- Resilience
- Transportation Interests

# Supply Chain

- The sequence of processes involved in the production and distribution of a commodity



# Agricultural Supply Chain



# Resiliency

- The ability to withstand or recover quickly from difficult situations



# Transportation Interests

- Why is DelDOT interested in the agricultural supply chains in DE?





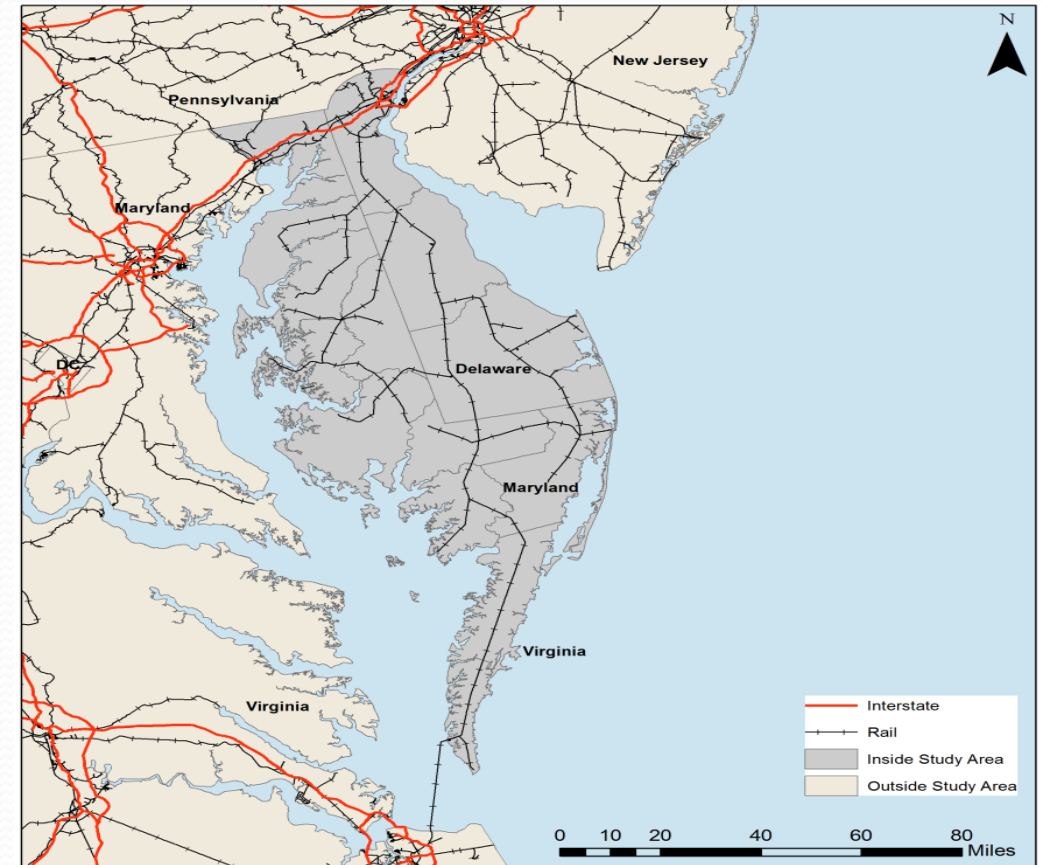
# Summary of agricultural findings

- Significant growth in crop irrigation has allowed Delaware and Delmarva crop yields to advance dramatically in the past decade
- Delaware corn yields have surged past the national average remaining above 190 bushels per acre during the past 3 seasons
- The greatest risk to these baseline figures is the starting point for corn yields
- Poultry production in Delmarva has seen a comeback in the past few years



# The Delmarva Study Region

- Delmarva Counties and Business Economic Areas (BEAs)
  - Covers three States and three BEAs
  - Washington, DC BEA includes Cecil, Kent, Queen Anne's, Talbot, Caroline, and Dorchester counties in Maryland.
  - Salisbury, VA BEA includes Northampton, Accomack, Worcester, Somerset, Wicomico, and Sussex counties in Virginia, Maryland and Delaware.
  - Philadelphia, PA BEA includes New Castle and Kent counties in Delaware.





# What has allowed for the rebound in regional poultry production?

- Reduced grain prices
- The industry in the region has become more comfortable
- Regional based integrators

# Factors effecting the projected corn deficit in Delmarva?

- Reduced global grain prices
- The region will see continued expansion in irrigation use as water supplies remain
- Another factor tempering the growth in irrigation moving forward will be the logistics of installing on rented land and also in smaller

# Overall Delmarva Freight Flows

- **Truck Traffic Dominates Tonnage**

- Tonnage will increasingly favor trucking
- Rail will grow slowest due to the nature of the regional network
  - Rail data is shown for Salisbury and Seaford terminals
- Water traffic will grow modestly
- Agricultural flows will grow on pace with general freight growth
- Water will become increasingly important to agricultural flows
- Rail will continue to be a small portion of the market

Delmarva Freight by Direction, thou. tons

Direction	2014	Share	2030	Share	CAGR
Inbound	26,406	20%	35,715	20%	1.9%
Local	7,573	6%	9,311	5%	1.3%
Outbound	29,132	22%	39,298	22%	1.9%
Through	71,943	53%	92,081	52%	1.6%
Total	135,054		176,405		1.7%

Delmarva Freight by Mode, thou. tons

Mode	2014	Share	2030	Share	CAGR
Truck	122,549	91%	161,405	91%	1.7%
Rail	2,834	2%	3,363	2%	1.1%
Water	9,671	7%	11,637	7%	1.2%
Total	135,054		176,405		1.7%

# Key Transportation Infrastructure

## Transportation Assets by Mode with Role Description

Mode	Assets	Role in the Regional Supply Chain
Roadways	I-95 System	<ul style="list-style-type: none"><li>• Primary point of entry and exit to the region by truck; includes I-295 and I-495</li><li>• Through route from South to Northeast of US and also to and around Wilmington</li><li>• Fresh, northbound poultry transits I-95 to major out-of-state markets like Pennsylvania and New York</li><li>• Grain and other chicken feed and vitamins coming from Pennsylvania, New York, and elsewhere in the Atlantic states also transit I-95</li></ul>
	State Highway System	<ul style="list-style-type: none"><li>• Primary north-south route is Delaware Route 1; US13 and US113 are vital spurs</li><li>• I-50 across the Chesapeake Bay is a critical corridor to/from Baltimore &amp; Washington</li><li>• Limited access in the more urbanized northern parts of the State</li></ul>
Seaports	Philadelphia	<ul style="list-style-type: none"><li>• Has an FDA foreign imports screening facility for food imports</li><li>• Major foreign imports-exports site for agriculture products</li></ul>
	Norfolk	<ul style="list-style-type: none"><li>• Major site for containerized exports of frozen poultry</li><li>• Grains consolidation and distribution to Delmarva</li></ul>
	Baltimore	<ul style="list-style-type: none"><li>• Some agriculture industry use for the Delmarva Peninsula</li></ul>
Freight Rail	Norfolk Southern	<ul style="list-style-type: none"><li>• The only Class I rail serving the Peninsula south of Wilmington via its Delmarva Secondary line, which runs north-south through Delaware and Maryland</li><li>• Limited to 8 trains ingress or egress per day due to bottleneck at Amtrak NEC</li></ul>
	Short-lines	<ul style="list-style-type: none"><li>• Connect the Delmarva Secondary to the Atlantic coast (DCLR and MDDE), Maryland (MDDE) and Virginia (BCRR)</li></ul>
Inland Waterways	Seaford	<ul style="list-style-type: none"><li>• Primarily handles inbound grain for chicken feed but also some outbound grain</li></ul>
	Salisbury	<ul style="list-style-type: none"><li>• Primarily handles inbound grain for chicken feed but also some outbound grain</li></ul>

# Truck Freight Flow Analysis Summary

- Almost half of freight tonnage is outbound from Delmarva
- Through tonnage is important to poultry-related tonnage
- Inbound tonnage is dominated by chicken feed, largely soybeans, while inbound value is largely live chickens for processing.
- Several major trucking flows dominate the overall tonnage and value of Delmarva freight flows.
- Chicken feed enters Delmarva by truck from nearby States.
- Live chickens enter Delmarva from North Carolina for processing.
- Outbound truck traffic is dominated by grain and soybeans after the harvest season



# Inbound Truck Freight Flow Analysis Summary

- Inbound truck flows are split between chicken feed, particularly soybeans, and live poultry for processing.
- Key commodities and origination points include Virginia, North Carolina and Pennsylvania.
- Truck flows tend to be more localized



# Poultry-Related Flows, Inbound Truck



# Outbound Truck Freight Flow Analysis Summary

- Outbound truck flows are dominated by grain, by tonnage, but by value poultry itself dominates flows.
- Destinations are dominated by New York, NY and Philadelphia, PA.
- Grain exports are distributed throughout the region during the harvest season.
- Animal by-products and fertilizers are key commodity groups for outbound truck traffic as well.
- Outbound tonnage should grow 1.4% through 2030, and 1.1% by value.

# Poultry-Related Flows, Outbound Truck





# Through Truck Freight Flow Analysis Summary

- Through truck traffic is closely linked to major consumer markets.
- The most important of which are Washington, DC, New York City, NY and Boston, MA
- Poultry flows that go through the study region are primarily through the I-93 corridor, and are for consumption.
- By value, processed poultry is the most important commodity group.





# Rail Freight Flow Analysis Summary

- Inbound flows form about 99.5% of overall rail tonnage.
- Inbound tonnage is almost entirely composed of chicken feed products.
  - This includes DDGs (Distillers Dried Grains), grains, soybeans and soybean meal.
- Outbound tonnage is small
- Soybean meal is most important commodity group, followed by grain and DDGs.
- Inbound rail tonnage comes primarily from the Midwest
- Poultry production on Delmarva, at the levels currently reached, requires significant grain and soybean meal from the Midwest and South of the United States.

# Inbound Rail Freight Flow Analysis Summary

- Chicken feed products drive inbound rail tonnage.
- DDGs are very important to tonnage
- Grain originates in the Midwest as well
- Soybeans and soybean meal

# Outbound Rail Freight Flow Analysis Summary

- Outbound rail flows are limited.
- Locations change from year to year
- The commodities sent are typically grain and soybeans.

# Water Freight Flow Analysis Summary

- Water traffic is primarily oriented toward chicken feed products.
- Water flows were weighted toward outbound traffic (56%) versus inbound traffic (43%).
- Norfolk, VA is a primary point of origination and a destination for water freight.

# Inbound Water Freight Flow Analysis Summary

- Chicken feed products like soybeans, soybean meal and grain are the primary contributors to inbound water flows.
- Soybeans and meal is imported from South America, then transloaded through Norfolk, VA.
- Norfolk is the primary source of inbound traffic, but Richmond, VA is also an important origination point.
- Another key origination point in the Lower Mississippi, in and around New Orleans, LA.



# Outbound Water Freight Flow Analysis

## Summary

- Barges moved approximately 378 thousand tons in 2014.
- This freight was mostly soybeans and grains.
- During harvest season, significant quantities of excess grain are sent by barge to the ports at Norfolk, VA.
- Barge traffic originates in Maryland, usually at the Vienna or Salisbury barge terminals.

# Illustration of the Poultry-Related Supply Chain

## Water

- Grain

## Train

- Grain
- Soybean meal
- DDGs

## Truck

- Chickens, Eggs
- Grain
- Fertilizer



## Truck

- Grain
- Dressed Poultry, Chickens, Eggs
- Soybeans
- Fertilizer/By-Products

# Conclusions

- Trucking is the most important mode.
- Rail allows access to the Midwest directly.
- Water gives access to international, Midwestern and other markets.
- The loss of barge or rail would not be catastrophic, in the short-term, but long-term both are required for continued poultry production growth.
- Local storage and production balances are key to determining transportation needs.



**Thank you!**